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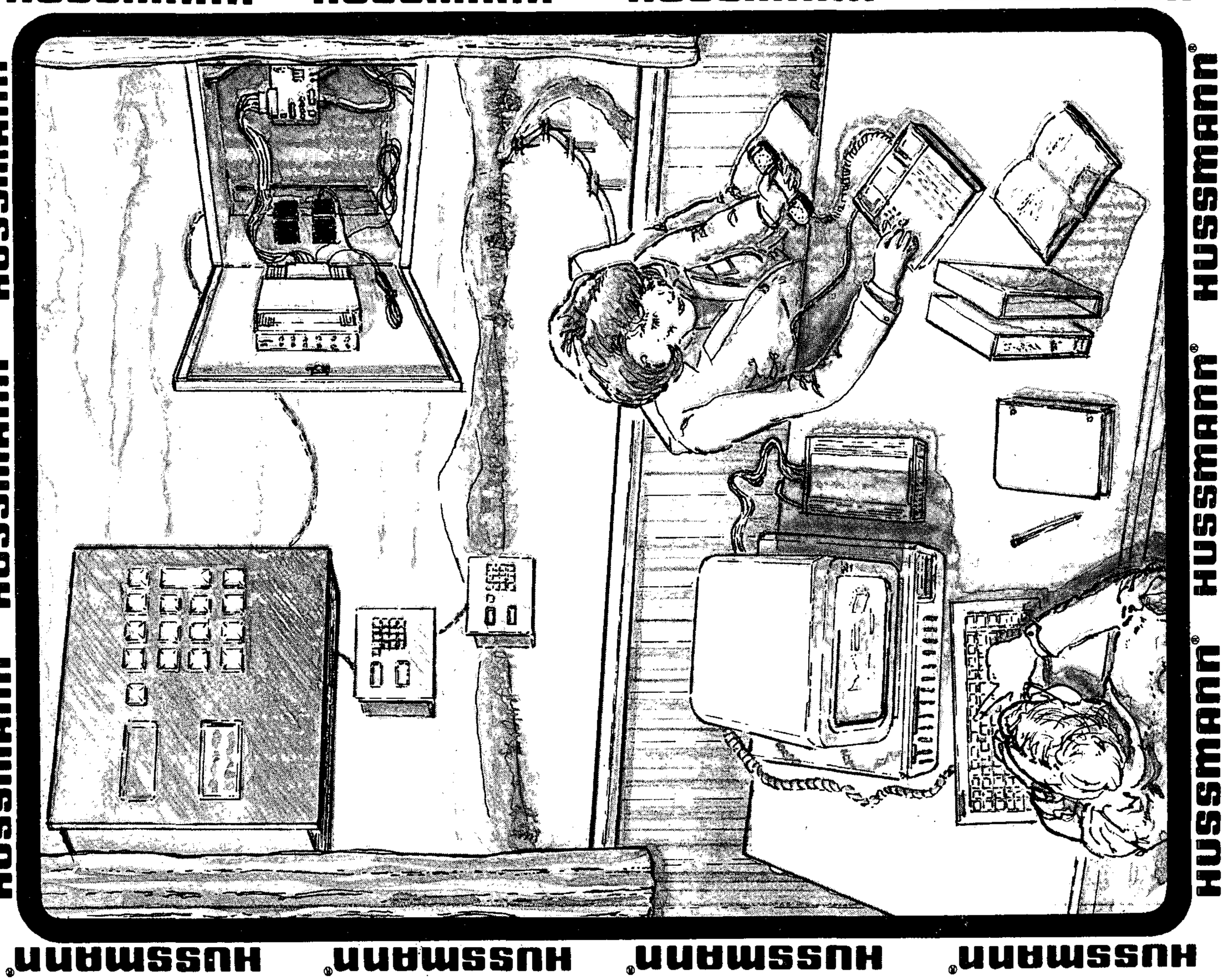

ENG. NO. 335718

April, 1988

C.C.I.
COMMUNICATIONS INSTALLATION / SERVICE INSTRUCTIONS

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DESCRIPTION OF PRODUCT

The EPC-2000 Commmunications package is a field installed kit to provide the additional parts necessary for communicating with one or several EPC-2000's in the supermarket machine room.

The communications package also includes a software program entitled COMPAK, which was developed by Hussmann Corporation to provide the interface between the personal computer and the EPC-2000. Installation and operation of the software program is detailed in a separate manual entitled "COMPAK MANUAL", P/N 0336134, enclosed in that package. The package allows connection of a Hayes or 100% compatible 1200 baud modem to the EPC-2000 controls (see Figure 1).

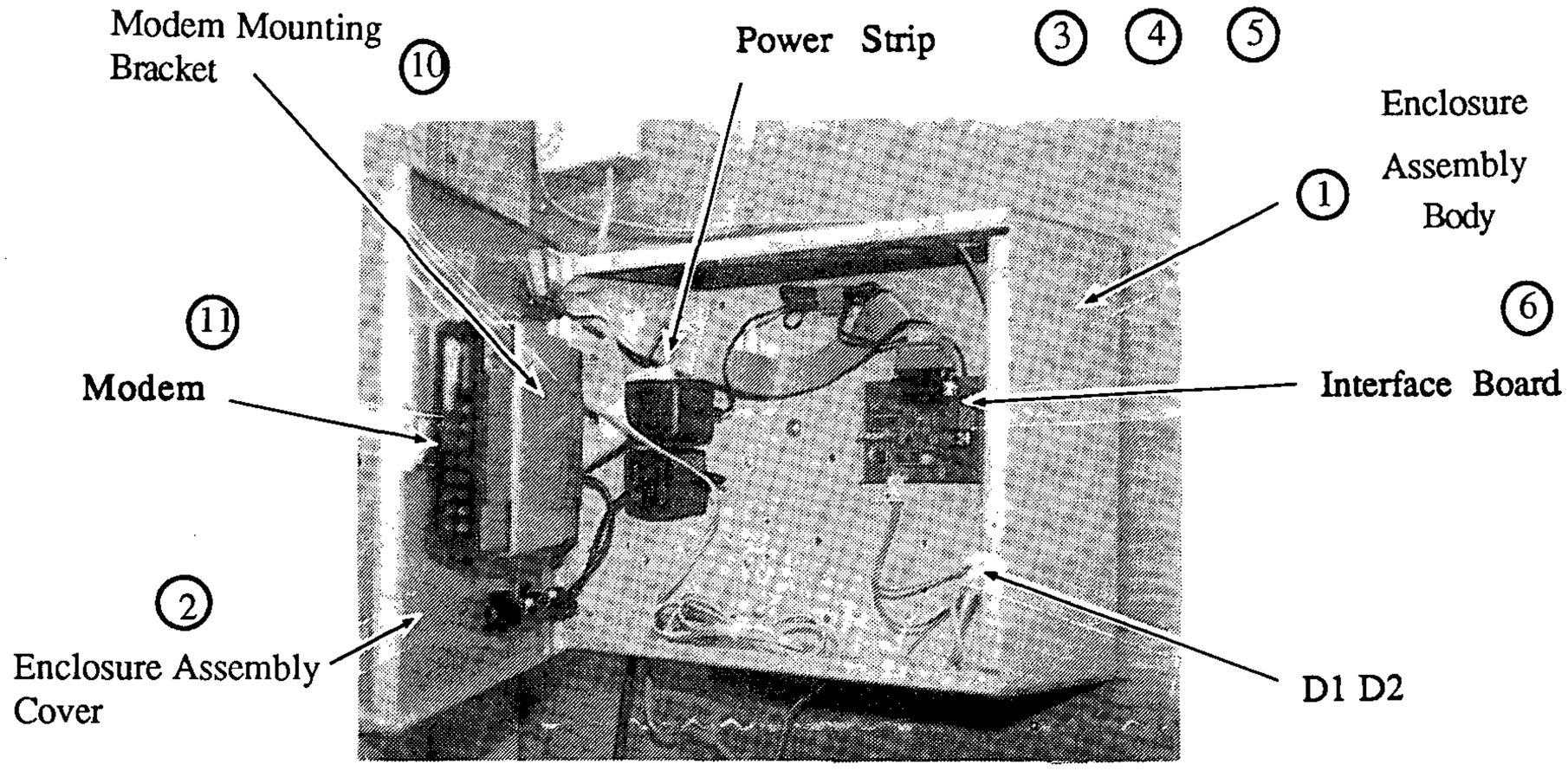


Figure 1. Location of Communication Package Internal Components

INSTALLATION

REQUIRED FIELD SUPPLIED PARTS

- 120V AC, 1 amp or greater power source
- 3/4 inch solid conduit with connectors for 120V AC supply
- 4 1/4 inch diameter lag bolts or 4 #14 wood screws
- Belden 9740 or equivalent twisted pair cable
- Wire butt splices
- Voice grade touchtone phone service with RJ11 jack, required for modem communications only

ENCLOSURE MOUNTING AND POWER WIRING

WARNING: When conducting steps 2, 3 and 4 shut OFF power to the circuit which will be supplying the 120V AC power for the communications enclosure.

1. Use the 1/4 inch lag bolts or #14 wood screws (if mounting to wood surface) to mount the communications enclosure to a wall inside the machine room. For convenience, locate the enclosure near a 120V AC power junction box. If remote communications is to be conducted, keep the phone jack location as close to the enclosure as possible.

2. Run 120V AC power to the enclosure using 3/4 inch solid conduit. Enter the enclosure using one of the two 7/8 inch knockouts on the lower left hand side. The knockouts are to be accessed by removing the field wiring access plate on the 3 receptacle power strip inside the enclosure (see Figure 2).

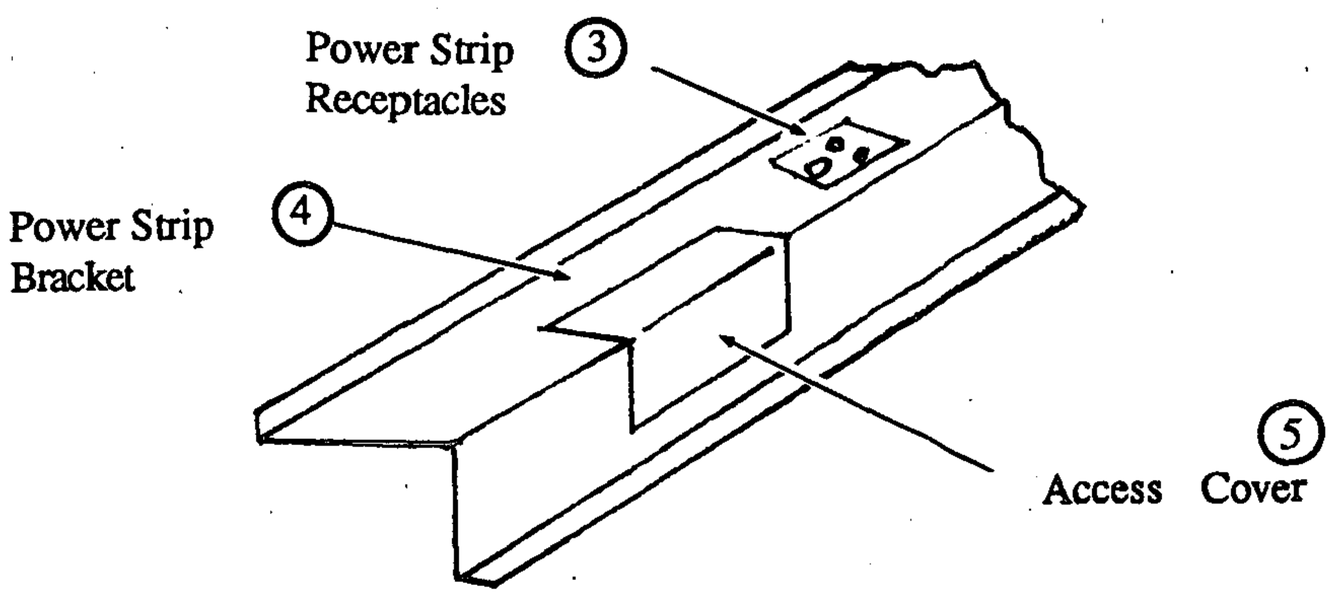


Figure 2. Access Cover Location on Receptacle Bracket

3. Wire the 120V AC power source with 14 ga. stranded to hot, neutral, and ground.

4. Using wire butt splices, connect the power wires to the receptacle power leads that are behind the field access cover. Connect hot to black, neutral to white, and ground to green. Place the access cover over the opening and screw down.

5. Re-apply power to the circuit supplying the 120V AC power. Check the three receptacles for correct operation by probing each with an AC voltmeter.

EPC-2000 CONNECTIONS

Each EPC-2000 refrigeration control that is to be monitored thru the communications package must be wired to the RS-232 interface board in the communications enclosure. Connection of the EPC-2000 controls and the interface board is to be accomplished using the factory supplied communications cables and the twisted pair cable supplied by the installer (see Figure 3).

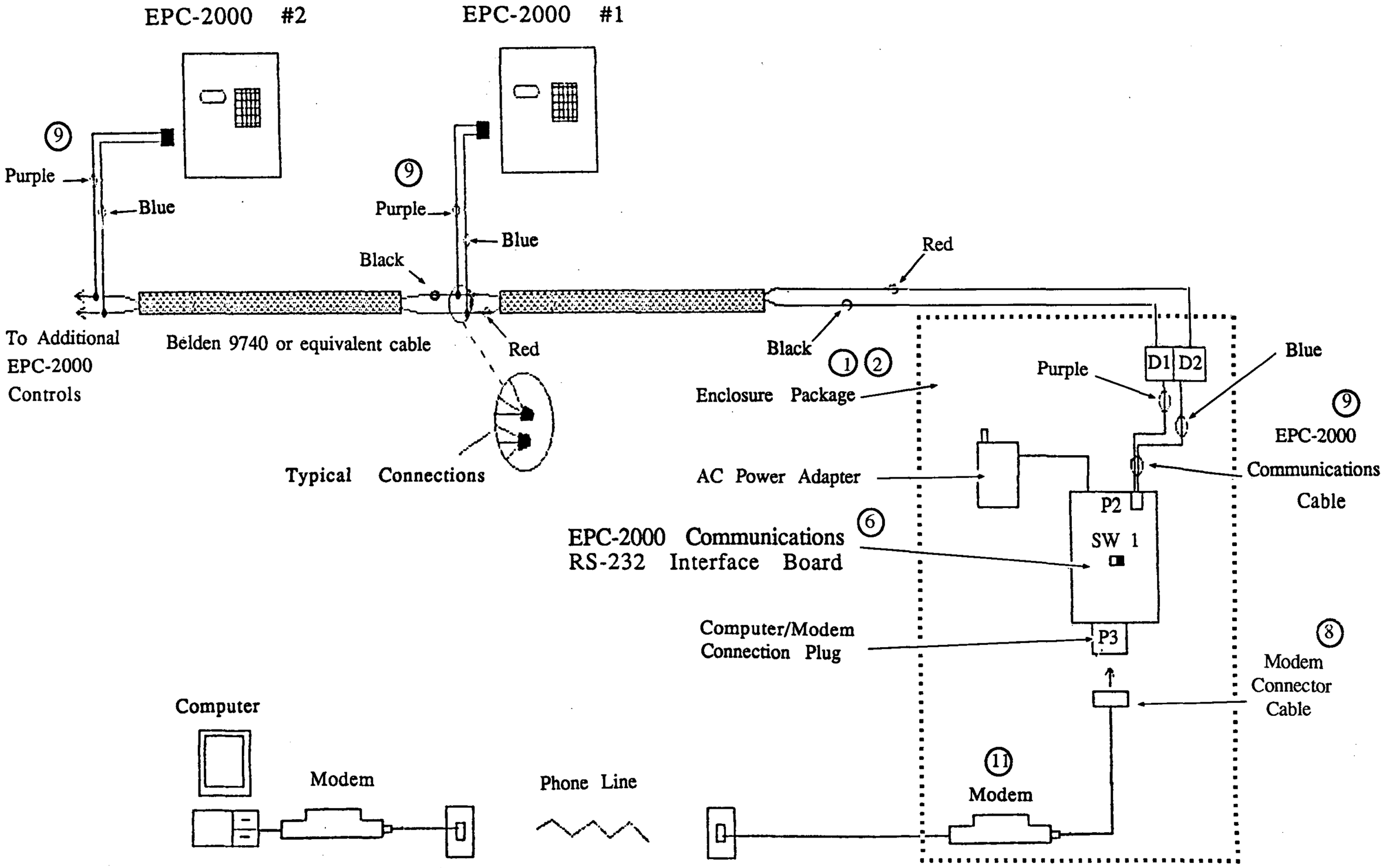


Figure 3. Field Wiring EPC-2000 Controls to RS-232 Interface Board

Listed below are the installation steps (see Figure 3). The wiring in this section is low voltage and need not be in conduit.

1. Run Belden 9740 twisted pair cable from the terminal blocks D1 & D2 located in the communications package enclosure to the first refrigeration rack controlled by an EPC-2000.

2. Enter the refrigeration control panel and run the cable to within 6 inches of the communication input plug on the processor. Avoid mixing the twisted pair cable with high voltage wiring.

3. Connect 1 EPC-2000 communications plug to the twisted pair cable as shown in Figure 3. If more than one EPC-2000 is to be connected to the interface board, then a daisy chain type of connection must be made as shown. Use crimp-on wire splices (see detail, Figure 3) to make good firm connections. Follow the wire colors indicated for correct connection.

4. Facing the back of the EPC-2000, remove the access cover over the communications input plug on the processor's lower right hand side. Plug the cable assembly into one of the two male pin plugs now exposed.

5. Repeat steps 2, 3 and 4 until all EPC-2000s have been connected using the single run of twisted pair cable. See Figure 3.

6. As described in the EPC-2000 operations manual, set the individual EPC-2000 communications station number to the desired number. The station numbers should start with 1 and increase in order until all controls are numbered. A suggestion for numbering is: rack A be station 1, rack B be 2, rack C be 3, until all racks with EPC-2000 controls are numbered.

MODEM SETUP/WIRING (REMOTE COMMUNICATIONS)

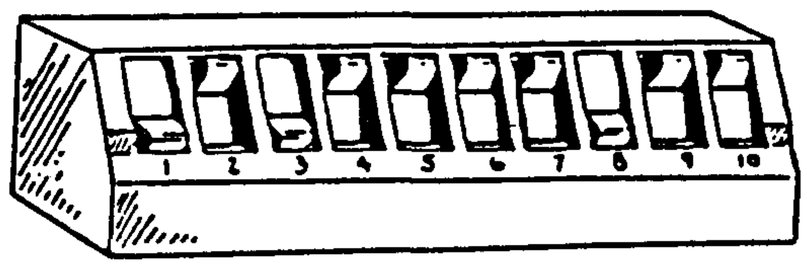
Remote communications can only be accomplished by use of a Hayes 1200 Smartmodem or compatible installed between the RS-232 interface board and a voice grade phone line. A communications package is available (89WS) which has a factory installed modem prewired to the RS-232 interface board. A second package is available (90WS) which provides a modem mounting bracket and connection cable for the RS-232 interface board. A Hayes 1200 Smartmodem or 100 per cent compatible modem must then be field supplied and installed inside the communications enclosure. The following instructions detail the required installation steps for both available kits. Refer to Figure 3 for a diagram of a completed system.

Factory Installed Modem (89WS)

1. Run a voice grade phone line from the wall mounted RJ11 socket into the top of the enclosure through one of the knock-outs. A 4 foot extender cable is supplied with the package. If a longer run is required, obtain one with the desired length that has the same type of connectors at the end.

2. After entering the enclosure, plug the phone cable into the "TO LINE" socket on the back of the modem. Refer to the enclosed modem manufacturer's instructions for details.

3. Set the modem configuration switches located behind the Hayes face plate to the positions shown in Figure 4. Refer to the modem installation manual for details on faceplate removal and switch description.



Switch #	Position
1	Down
2	Up
3	Down
4	Up
5	Up
6	Up
7	Up
8	Down
9	Up
10	Up

Figure 4. Hayes 1200 Configuration Switch Setting

4. After reinstalling the face plate, insert the modem power cable into the back of the modem and plug the power source end into the 120V AC power strip.

5. Turn on the modem power strip switch at the back of the modem.

Field Installed Modem (90WS)

1. Mount the Hayes 1200 Smartmodem or compatible modem inside the communcations enclosure on the door. Use the available mounting bracket to hold the modem.

2. Connect the modem to the RS-232 interface board plug P3 located in the enclosure using the supplied modem connector cable (0335714). Secure the cable using the supplied cable ties and adhesive mounts.

3. Connect the power plug to the modem and use the 120V AC power strip inside the enclosure for line voltage.

4. Run a voice grade touchtone phone line into the top of the enclosure from the wall mounted RJ11 socket. A 4 foot extender cable is supplied with the package. If a longer run is required, obtain one with the desired length that has the same type of connectors at the ends.

5. After entering the enclosure, plug the phone cable into the modem "line" socket. Refer to modem manufacturer's manual for details.

6. The modem installed must be configured in order to operate with COMPAK and the RS-232 interface board. If a Hayes 1200 Smartmodem was selected, refer back to step 3 of Factory Installed Modem (89WS) section. For modems that are not Hayes 1200 brand but are 100 per cent compatible, the following items are to be considered when setting up the modem. Consult the manufacturer's manual for more details.

   . Set 1200 baud data rate

   . Set Data Terminal Ready (DTR) to ready

   . Force Carrier Detect (CD) to on

   . Enable Auto Answer feature

7. After completion of the above steps, turn on the modem.

RS-232 INTERFACE BOARD CONFIGURATION

The RS-232 interface board (see Figure 5) should now be completely wired. This section will review the required connection points and the proper setting of switch SW1.

1. Plug P2. An EPC-2000 Communications Cable P/N 0335709 should be factory wired to the D1 and D2 terminals and inserted into P2. The purple wire of the cable assembly should be connected to terminal D1 and the blue wire connected to terminal D2.

2. Plug P3. The modem connection cable should be inserted into this plug.

3. Switch SW1. SW1 is a selector switch to set the interface board to operate with a modem for remote communications. The switch must be set to MODEM in order for remote communications with the EPC-2000 to be possible.

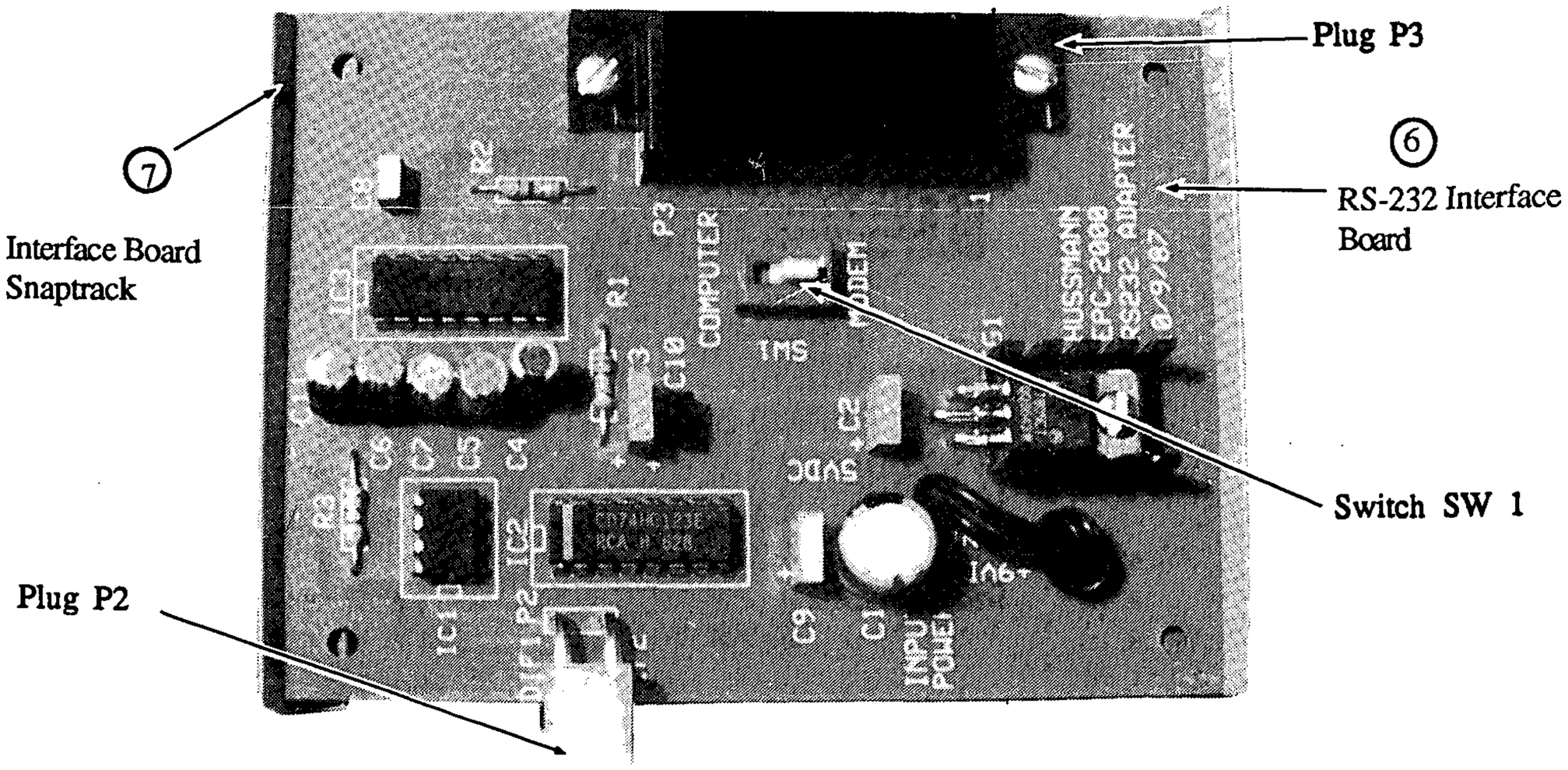


Figure 5. RS-232 Interface Board

FACTORY SUPPLIED PARTS LIST

ITEM	DESCRIPTION	P/N	QTY
1	Enclosure Assembly Body	0335704	1
2	Enclosure Assembly Cover	0335702	1
3	Power Strip Receptacles	0335715	3
4	Power Strip Bracket	0335705	1
5	Power Strip Access Cover	0335706	1
6	RS-232 Interface Board	0335713	1
7	Interface Board Snaptrack	0335708	3
8	Modem Connector Cable	0335714	1
9	EPC-2000 Comm. Cable	0335709	6
10	Modem Mounting Bracket	0335707	1
11	Hayes 1200 Smartmodem (89WS) with RJ11 Extender Cable - 4 ft. (optional)	0335716	1

FACTORY SUPPLIED PARTS LIST continued

ITEM	DESCRIPTION	P/N	QTY
	COMPAK Software Package	0336133	1
	COMPAK Manual	0336134	1
	COMPAK Program 3 1/2 disk	0336135	1
	COMPAK Program 5 1/4 disk	0336136	1

SERVICE/TROUBLESHOOTING

COMMUNICATIONS CHECKOUT AND TROUBLESHOOTING

Checkout or troubleshooting of the EPC-2000 Communications package "COMPAK" consists of three steps.

The steps are:

1. Pre-powerup checks
2. Powerup observations
3. Program checkout using a personal computer (PC)

The testing procedure is broken into three parts due to all three parts of the package being needed for complete operation.

The entire installation procedure must be completed and a PC must be used to run the communications program "COMPAK" before checkout can be accomplished. Consequently, it is very important to review the pre-powerup and powerup observations tables before running the program. This will minimize or eliminate troubleshooting.

It is important that the PC is properly configured and operational before attempting to run the file "COMPAK.COM". Hussmann will not take the responsibility for PC failures or poor PC installation. The manufacturer of the equipment has all the responsibility.

Seven error messages contained in the program "COMPAK" are identified and explained in the tables which follow. These messages are displayed on the PC when operation of the program is halted due to a hardware failure in the PC or at the store site.

The COMPAK software program manual contains a complete descriptive operation of the file "COMPAK.COM". Examples are given step by step for each function the program performs. Consult that manual, P/N 336134, supplied with the communications package for questions dealing with operation of the program.

PRE POWER UP CHECKS ON LOCATION		
ITEM	REQUIREMENT	CORRECTIVE ACTION
Power wiring	120V AC wired to power strip leads located behind field access plate	Install per instructions in Installation section of this manual
Modem and RS-232 power plugs	Each power plug should be in one of the three available duplex receptacles of the power strip	Insert plugs as instructed. Verify that the end of the modem power cable is inserted into the back of this modem.
Modem power switch ON	Switch should be in position 1 for Hayes 1200	Turn switch to position 1
RS-232 Interface Board P3 Plug Assembly is installed	Local Communications: One end of Cable Assembly in P3 of RS-232 Interface Board and the other inserted into a PC serial port 1 or 2. Put switch SW1 in COMPUTER position. Remote Communications: One end of Cable Assembly in P3 of RS-232 Interface Board and the other inserted into the Modem RS-232 input on the back of the Modem. Put switch SW1 in MODEM position.	Install per instructions in Installation section Install Per instructions in Installation section
Phone line connection (remote operation only)	The Modem must be connected to the wall service jack. Modem connection point must be in the "Wall" or "Line" labeled plug on the back of the Modem. The point labeled "Phone" is not correct.	Install per instructions in Installation section

INITIAL POWER UP OBSERVATIONS ON LOCATION		
OBSERVATION	PROBABLE CAUSE	CORRECTIVE ACTION
EPC-2000 processor connections	Figure 3 shows the connection requirements for EPC-2000 to RS-232 Interface Board cable wiring. Wire colors are to be followed and no crossing of connections. EPC-2000 will not communicate if wires are crossed.	Install per instructions in Installation section. See Figure 3.
Modem powered-120V All LEDs blank	Power supply problem	Modem turned ON Check 120V AC is at power strip in enclosure Check 12 to 15V AC at modem input power plug Modem failure
Modem LEDs MR, TR, AA, and HS are NOT ALL ON. COMPAK software not calling store as yet.	Modem switches not set properly	. If Hayes 1200 use switch settings in Installation section . If Hayes compatible set switches for below operation . Follows DTR . Word Result Codes . Result Codes displayed . Characters echoed in command state . Auto Answer enabled . Carrier Detect true . RJ11 style phone jack . Command recognition enabled . Bell 212A standard . DTR transition causes hang-up . Consult modem manufacturer
Above modem LEDs ON and the SD LED comes on, but COMPAK is not calling store yet.	EPC Station #'s not set yet	Refer to EPC-2000 Installation manual and set station #'s for each EPC-2000 process

COMPAK COMMUNICATIONS CHECK OUT USING A PC		
COMPAK ERROR MESSAGES	**PROBABLE CAUSE**	**CORRECTIVE ACTION**
Error - Invalid Configuration encountered, run "CPINST" to reconfigure	The "CPINST.COM" file was not configured in the installation of COMPAK software	Run "CPINST.COM" located in the COMPAK directory to reconfigure. If this procedure does not work, replace COMPAK diskette.
Error - Serial Port malfunction	The Serial Port could not be found by COMPAK or is failing	Choose another port. Refer to COMPAK manual for specifications on port selection. Check for correct installation and operation of the port. This is not a COMPAK software problem, the fault is in the PC.
Error - Unable to transmit data to EPC-2000	COMPAK could not send data out of the Serial Port to the modem or EPC-2000. The problem exists in the Serial Port of the PC.	Check for correct installation and operation of the Serial Port. Consult Serial Port instructions of the manufacturer. This is not a COMPAK software or EPC-2000 fault.
Error - Could not locate modem	The modem did not respond when COMPAK attempted to locate and configure it	Check to see that the modem is connected to COM port 1 or 2 only. Try changing COM ports to locate the modem. Compak defaults to Port 1 unless specified, but will also seek Port 2. Verify that the modem to be installed is 100% Hayes compatible and is configured properly. Consult modem instructions and manufacturer for help if necessary.

COMPAK COMMUNICATIONS CHECK OUT USING A PC		
COMPAK ERROR MESSAGES	PROBABLE CAUSE	CORRECTIVE ACTION
Error - could not connect	Receiving modem at the store did not answer and connect within the given connect time.	Check the modem switch setting and installation. The problem is with the modem and not with the PC or RS-232 interface board at the store. Verify the store modem is 100% Hayes compatible.
Error - EPC station error	The EPC-2000 returned incorrect data or an error signal when attempting to read the EPC-2000 in the store. A bad phone line might corrupt the returning data from the store.	Verify that software in the EPC-2000 generating the "station error" is version 1.04E or higher. If not, contact Hussmann to replace with newer version. Have phone line checked for noise levels or other problems. Replace EPC-2000 if problem continues with new software 1.04E or higher.
Error - communications time-out (all EPC-2000 controllers will not communicate) Situation A	COMPAK is not receiving any information from the EPC-2000s in the store. The problem is with the RS-232 Interface Board, connection wiring, or the respective EPC-2000s in the store. The modem in the store is operating correctly and is not part of the problem.	To isolate the problem, the following troubleshooting steps should be conducted. 1. Check continuity of the modem to RS-232 Interface board cable. Refer to Figure 6 for pin identification. Replace the cable (P/N 335714) if a problem is found.

COMPAK COMMUNICATIONS CHECK OUT USING A PC

COMPAK ERROR MESSAGES	PROBABLE CAUSE	CORRECTIVE ACTION
Error - communications time-out (all EPC-2000 controllers will not communicate) Situation A continued		2. Check the installation of the twisted pair cable and communications plug to the EPC-2000s. The plug should fit firmly into the communications receptacle "lower right-hand" opening. Refer to Figure 3. Verify that all the EPC-2000 controls are well grounded to their respective racks. 3. Check the RS-232 Interface Board to verify that switch SW1 is in the correct position. MODEM for remote communications using a modem or COMPUTER for direct connection to the PC serial port running COMPAK. Place the switch in the proper position. 4. Using a voltmeter, measure the voltage between the two points on the RS-232 Interface Board shown in Figure 7. The voltage measured should be 4.75 to 5.25V DC. Replace the interface board if voltage is not correct. 5. Check all EPC-2000 controls and verify that station numbers are set as previously directed.

COMPAK COMMUNICATIONS CHECK OUT USING A PC		
COMPAK ERROR MESSAGES	PROBABLE CAUSE	CORRECTIVE ACTION
		6. Check all EPC-2000 software to verify they are version 1.04E or higher. Contact Hussmann service department for new EPC-2000 software if you have version 1.03T. 7. Replace the RS-232 Interface Board P/N 335713 if the above checks do not locate the problem.
Error - Communications Time Out Situation B In this situation, communications with specific EPC-2000(s) is not possible. However, communications with the remaining EPC-2000(s) in the store is possible.	COMPAK did not receive the information requested from the specified EPC-2000. The problem lies with the wiring of the EPC-2000 communications cable or the control itself. The problem does not involve the modem or interface board.	1. Check the connection of the communications plug assembly to the twisted pair cable used to connect all EPC-2000 controls to the interface board. See Figure 3. 2. Check that the two pin plug of the communications plug assembly mates properly with the non-communicating EPC-2000. Replace the plug assembly P/N 335712 if the connection is not secure. 3. Check the software. Version 1.04 or higher must be shown in the STATUS menu. If 1.03T is installed, communications will not work, contact Hussmann for a software change. 4. If the problem is not resolved, replace the questionable EPC-2000.

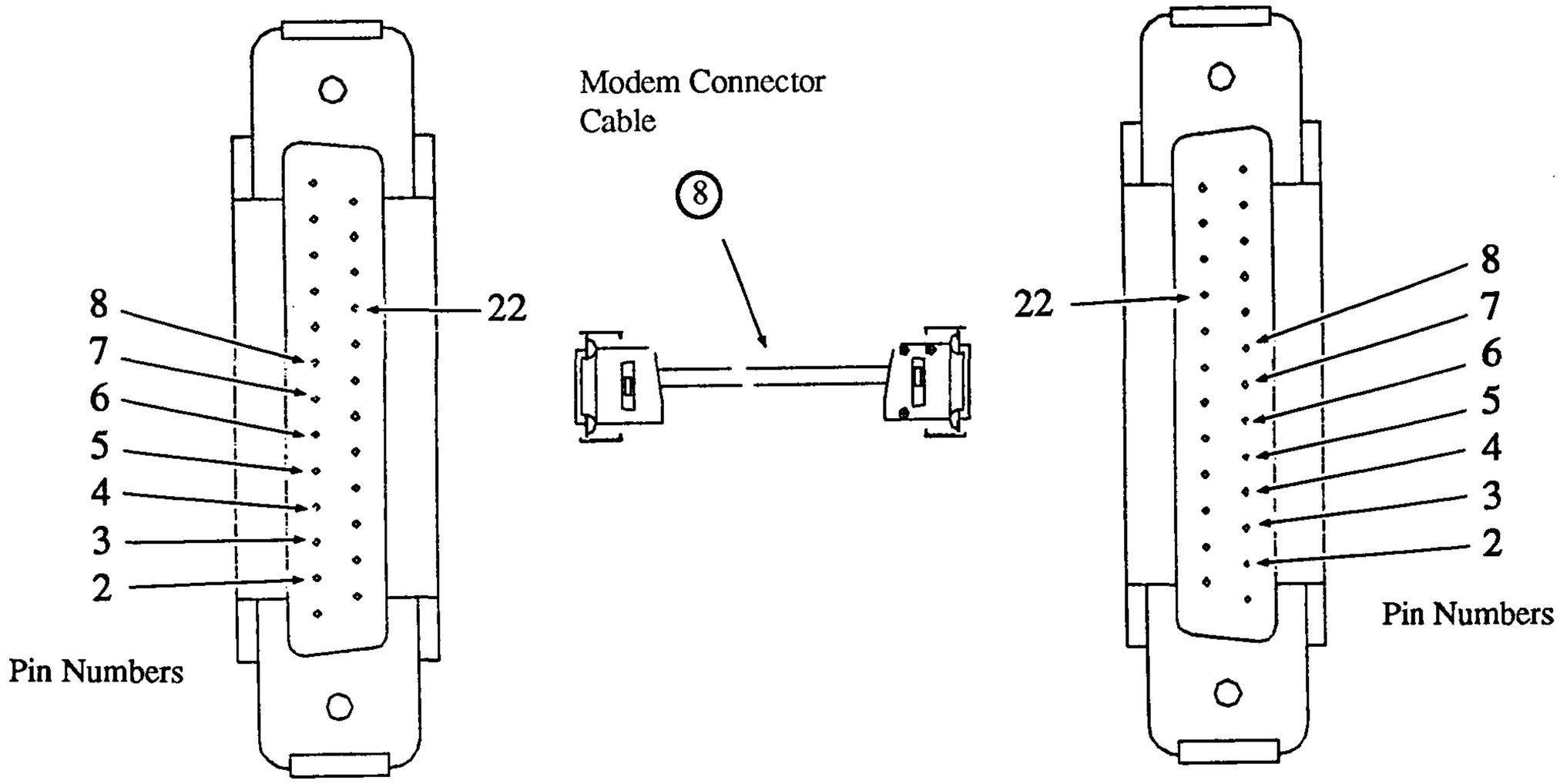


Figure 6. RS-232 Communications Cable Checkout

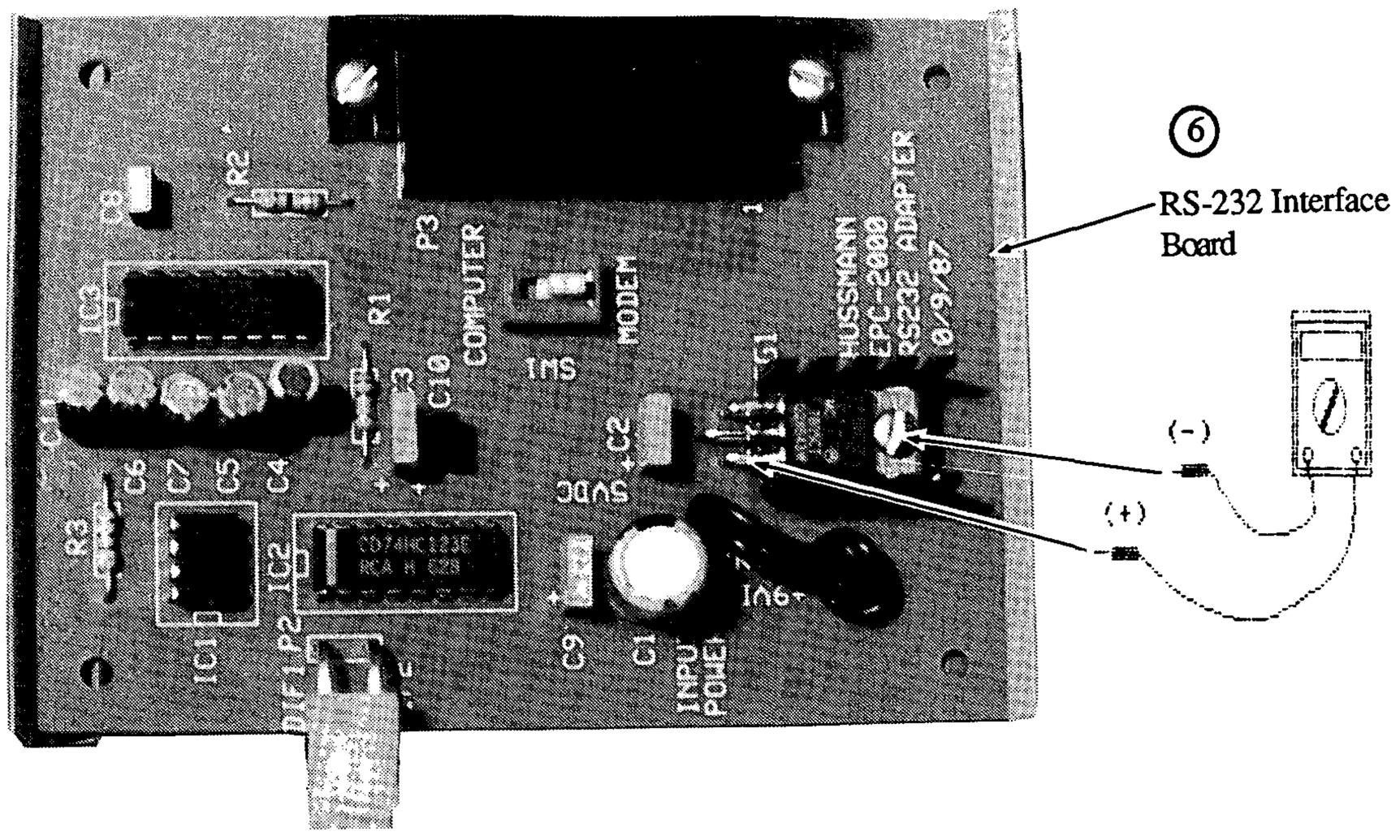


Figure 7. Voltage Check of RS-232 Interface Board Voltage Regulator